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Stretching chirality to the extreme

The phenomenon of chirality appears in many areas of science with special incidence in chemistry and dramatic consequences in life sciences. It is common in several branches of mathematics such as topology, geometry and combinatorics. Chirality of regular oriented "objects" like maps, hypermaps and polytopes is not merely a binary invariant but can be quantified by two invariants—the chirality group and the chirality index. While every finite abelian group arises as a chirality group of some (hyper)map, many non-abelian groups, including symmetric and dihedral groups, cannot arise as chirality groups. The most extreme type of chirality arises when the chirality group coincides with the monodromy group. Such (hyper)maps are called totally chiral and they seam to be extremely rare. Examples of them though can be constructed by considering appropriate "asymmetric" pairs of generators of certain non-abelian simple groups. In this talk we speak about chirality in maps and hypermaps giving more emphasis to the extreme case of chirality.